

Serial No. 10/034,054

Attorney Docket No. PCI-784

This listing of claims will replace all prior versions and listings of claims in this application.

Listing of Claims:

1. (cancelled) A pump comprising:

a piston formed of a magnetostrictive material susceptible to changes in physical dimensions in the presence of a magnetic field;

first and second pumping chambers coupled to said magnetostrictive element to vary in volume as said magnetostrictive element changes shape.

2. (previously amended) A pump comprising:

a piston formed of a magnetostrictive material susceptible to changes in physical dimensions in the presence of a magnetic field; and

first and second pumping chambers coupled to said magnetostrictive element to vary in volume as said magnetostrictive element changes shape,

wherein said first and second pumping chambers are driven by opposite ends of said magnetostrictive element, to change volume in phase with each other.

3. (original) The pump of claim 2, wherein said magnetostrictive element has a lengthwise extent, and said first and second pumping chambers are driven by opposite ends of said element at opposite ends of said lengthwise extent.

4. (original) The pump of claim 3, wherein said pumping first and second chambers are located at opposing ends of said lengthwise extent.

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5. (cancelled) The pump of claim 1, wherein said first and second pumping chambers are driven by said magnetostrictive element to change volume in opposing phase with each other, so that one chamber has a maximum volume as the other has a minimum volume.
6. (previously amended) The pump of claim 2, further comprising a third pumping chamber, driven by said magnetostrictive element to pump out of phase with said first and second pumping chambers.
7. (original) A pump comprising:
a housing defining a cylindrical cavity;
a cylindrical actuator formed of magnetostrictive material, within said housing and coaxial therewith;
first and second pumping chambers within said housing at opposite ends of a lengthwise extent of said magnetostrictive element, each of said pumping chambers mechanically coupled to said actuator, to compress as said actuator extends in length.
8. (original) The pump of claim 7, wherein fluid in each of said first and second pumping chambers is displaced by a lengthwise extension of said actuator.
9. (original) The pump of claim 8, further comprising a third chamber extending axially along a length of said actuator, fluid in said third chamber displaced by a radial expansion of said actuator.
10. (original) The pump of claim 9, wherein inlets of said first, second, and third pumping chambers are fluidly coupled.

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11. (original) The pump of claim 10, wherein outlets of said first, second, and third pumping chambers are fluidly coupled.
12. (previously amended) A pumping assembly, comprising a plurality of pumps in accordance with claim 2, wherein inputs and outputs of said plurality of pumps are interconnected in parallel.
13. (original) The pumping assembly of claim 12, wherein each of said plurality of pumps is driven out of phase with each other one of said plurality of pumps.
14. (original) The pumping assembly of claim 13, comprising three pumps.
15. (previously amended) A pumping assembly, comprising a plurality of pumps in accordance with claim 2, wherein inputs and outputs of said plurality of pumps are interconnected in series.
16. (original) A method of pumping fluid using a magnetostrictive element comprising:

applying a magnetic field to a magnetostrictive element to cause lengthwise extension of said element at two opposing ends;
driving a first pumping chamber through said extension of a first end of said two opposing ends;
driving a second pumping chamber through said extension of a second of said two opposing ends, opposite said first end, wherein said first pumping chamber is driven in phase with said second pumping chamber.

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17. (original) The method of claim 16, further comprising
allowing said magnetostrictive element to contract lengthwise,
and extend widthwise;
driving a third pumping chamber with said widthwise expansion
of said magnetostrictive element.